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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/676,269	09/28/2000	Jian J. Chen	LAM1P151	6726

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EXAMINER
ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 07/08/2003

16

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/676,269	CHEN ET AL.	
	Examiner	Art Unit	
	Luz L. Alejandro	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,13,15-24 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,13,15-24 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5-8-03 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-7, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757.

Imafuku et al. shows the invention substantially as claimed including a plasma confining assembly for minimizing unwanted plasma formations in regions outside of a process region in a plasma chamber 2, comprising: a first confining element 27

positioned proximate the periphery of the process region and in an upper portion of the process chamber, and including an exposed conductive surface that is electrically grounded; and a second confining element 47 positioned proximate the periphery of the process region, the second confining element being spaced apart from the first confining element and in a lower portion of the process chamber such that one of the confining elements is disposed in an upper portion of the process chamber and the other confining element is disposed in a lower portion of the process chamber, wherein the first and second confining elements substantially reduce the effects of plasma forming components that pass therebetween (see fig. 11 and its description).

Imafuku et al. further discloses that the second confining element can be conductive and grounded (see col. 11-lines 58-67), but fails to disclose an exposed insulating surface which is configured to at least partially cover the conductive part of the second confining element. Aruga et al. discloses covering a conductive surface with an insulating ceramic in order to protect the conductive surface from attack by the plasma (see col. 5-lines 25-30). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. so as to cover the second confining element with an insulator as suggested by Aruga et al. because in such a way the conductive portion of the second confining element would not be attacked by the plasma.

With respect to claim 4, the plasma forming components in both Imafuku et al. and Aruga et al. are charged particles or electric fields.

Concerning claims 5-6, the apparatus of Imafuku et al. modified by Aruga et al. would contain the claimed first and second confining element structure arrangement and therefore the apparatus of Imafuku et al. modified by Aruga et al. would have a first and second confining element arranged to direct charged particles to the exposed conductive surface and sink charged particles therethrough to ground so as to reduce the density of charged particles in regions outside the process region, and the elements would also be arranged to attract electric fields to the grounded conductive surface and the grounded conductive portion, respectively, so as to reduce the electric field strength in regions outside of the processing region. Furthermore, the second confining element is spaced from the first confining element so as to form an open area therebetween that permits by-product gases to pass therethrough from the process region to the regions outside of the process region while substantially preventing charged particles or electric fields from passing therethrough from the process region to the regions outside of the process region.

With respect to claim 9, note that rearrangement of parts of an apparatus does not render the apparatus patentable when the rearrangement of parts of the apparatus would not have modified the operation of the apparatus (see In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)).

Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757 as

applied to claims 1, 4-7, and 9 above, and further in view of Takaki et al., U.S. Patent 6,279,504 B1 or Nawata et al., U.S. Patent 6,444,087 B2.

Imafuku et al. and Aruga et al. are applied as above but do not expressly disclose wherein the non-exposed conductive core is formed from aluminum and the exposed insulating surface is formed from anodized aluminum.

First, the examiner respectfully contends that aluminum is a well known conductive material and anodized aluminum is a well known insulating material, and both materials are used in a plasma environment. Furthermore, Nawata et al. and Takaki et al. both disclose an aluminum conductor covered by an anodized aluminum insulator (see col. 1-lines 49-54 of Nawata et al. and fig. 10, col. 17-lines 8-28 of Takaki et al.). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. modified by Aruga et al. so as to form the second confining element of an aluminum material with an alumina material thereover because both Takaki et al. and Nawata et al. show these materials to be suitable for use in a plasma apparatus.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757 as applied to claims 1, 4-7, and 9 above, and further in view of Lenz et al., U.S. Patent 5,534,751.

Both Imafuku et al. and Aruga et al. are applied as above but fail to expressly disclose a third confining element formed from an insulating material and disposed

between the first confining element and the second confining element, and proximate the periphery of the process region, the third confining element being arranged to physically contain the plasma inside the process region, and to substantially reduce the effects of plasma forming components that pass between the first confining element and the second confining element. Lenz et al. discloses a ring assembly 30 used for plasma confinement and including a stack of circular rings that contain an insulating material of, for example, quartz (see figs. 1-2 and col. 6-lines 16-65). Additionally, note that the ring assembly 30 is configured to physically confine the plasma within the process region while permitting the process gases to pass through passages 31 (see fig. 1 and col. 6-lines 30-35). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. modified by Aruga et al. so as to contain the plasma confinement element of Lenz et al. in order to confine the plasma in the process region.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757 as applied to claims 1, 4-7, and 9 above, and further in view of Lenz, U.S. Patent 5,998,932 or Lenz, WO 00/00992.

Both Imafuku et al. and Aruga et al. are applied as above but fail to expressly disclose a third confining element formed from an insulating material and disposed between the first confining element and the second confining element, and proximate the periphery of the process region, the third confining element being arranged to

physically contain the plasma inside the process region, and to substantially reduce the effects of plasma forming components that pass between the first confining element and the second confining element. Lenz discloses confinement element used for plasma confinement and including circular rings 102a, 102b that contain an insulating material (see figs. 1-4 and their description, especially col. 1-lines 48-50 of Lenz, U.S. 5,998,932; and paragraph bridging pages 1 and 2 of Lenz WO 00/00992). Additionally, note that the confinement element is configured to physically confine the plasma within the process region while permitting the process gases to pass through passages therebetween (see figs. 1-4 of both Lenz U.S. 5,998,932 and Lenz WO 00/00992). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. modified by Aruga et al. so as to contain the plasma confinement element of Lenz et al. in order to confine the plasma in the process region to improve process control and to ensure repeatability.

Claims 8, 10, 16-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757 as applied to claims 1, 4-7, and 9 above, and further in view of Hasegawa et al., U.S. Patent 5,271,788.

Imafuku et al. and Aruga et al. are applied as above but fail to expressly disclose wherein the second confining element is a ring that surrounds a lower electrode. Hasegawa et al. discloses a confining element 16,32 that surrounds a lower electrode

12 (see fig. 3 and col. 4-line 43 to col. 5-line 7). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. modified by Aruga et al. so as to form the second confining element so as to surround the lower electrode because in such a way the electrode would be protected from the plasma and therefore, the apparatus of Imafuku et al. modified by Aruga et al. would be optimized.

Regarding claims 8, 10, 17, and 22, note that the first confining element in Imafuku et al. is a ring that surrounds an upper electrode. Furthermore, note that rearrangement of parts of an apparatus does not render the apparatus patentable when the rearrangement of parts of the apparatus would not have modified the operation of the apparatus (see In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)).

Concerning claims 16 and 21, note that rearrangement of parts has been held to have been obvious (see In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950)). Furthermore, the configuration of the claimed exposed insulating surface, and of the first and second rings, is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the exposed insulating surface, and of the first and second rings, is significant (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)).

With respect to claim 18, note that the first ring of Imafuku et al. includes an inner ring and an outer ring wherein the inner ring is formed from a dielectric medium and is configured to be disposed between the first electrode and the outer ring, and wherein

the outer ring includes the conductive member of the first ring (see fig. 11 especially the dielectric member between ring 27 and electrode 21).

Concerning claim 19, note that Imafuku et al. in fig. 23 shows an insulating member 5a configured to be disposed between the second electrode and the outer ring. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of fig. 11 of Imafuku et al. as to further comprise an insulating member disposed between the second electrode and the outer ring as shown in the embodiment of fig. 23 of Imafuku et al. in order to provide appropriate electrical separation between the conductive elements.

With respect to claim 24, note that the first and second confining elements are located between the process region and the exhaust port (see fig. 11 of Imafuku et al.). Furthermore, regarding claim 26, note that the exposed conductive member of the first confining element and the exposed insulating portion of the second confining element each include surfaces that are substantially parallel to one another and that are perpendicular to the boundary between the process region where a plasma is ignited and sustained for processing a workpiece and the regions outside of the process region where the plasma is not desired (see fig. 11).

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757 and further in view of Hasegawa et al., U.S. Patent 5,271,788 as applied to claims 8, 10, 16-24 and 26 above, and further in view of Lenz et al., U.S. Patent 5,534,751.

Imafuku et al., Aruga et al., and Hasegawa et al. are applied as above but fail to expressly disclose a third confining element formed from an insulating material and disposed between the first confining element and the second confining element, and proximate the periphery of the process region, the third confining element being arranged to physically contain the plasma inside the process region, and to substantially reduce the effects of plasma forming components that pass between the first confining element and the second confining element. Lenz et al. discloses a ring assembly 30 used for plasma confinement and including a stack of circular rings that contain an insulating material of, for example, quartz (see figs. 1-2 and col. 6-lines 16-65). Additionally, note that the ring assembly 30 is configured to physically confine the plasma within the process region while permitting the process gases to pass through passages 31 (see fig. 1 and col. 6-lines 30-35). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. modified by Aruga et al. and Hasegawa et al. so as to contain the plasma confinement element of Lenz et al. in order to confine the plasma in the process region.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imafuku et al., U.S. Patent 6,074,518 in view of Aruga et al., U.S. Patent 5,456,757 and further in view of Hasegawa et al., U.S. Patent 5,271,788 as applied to claims 8, 10, 16-24 and 26 above, and further in view of Lenz, U.S. Patent 5,998,932 or Lenz, WO 00/00992.

Imafuku et al., Aruga et al., and Hasegawa et al. are applied as above but fail to expressly disclose a third confining element formed from an insulating material and disposed between the first confining element and the second confining element, and proximate the periphery of the process region, the third confining element being arranged to physically contain the plasma inside the process region, and to substantially reduce the effects of plasma forming components that pass between the first confining element and the second confining element. Lenz discloses confinement element used for plasma confinement and including circular rings 102a, 102b that contain an insulating material (see figs. 1-4 and their description, especially col. 1-lines 48-50 of Lenz, U.S. 5,998,932; and paragraph bridging pages 1 and 2 of Lenz WO 00/00992). Additionally, note that the confinement element is configured to physically confine the plasma within the process region while permitting the process gases to pass through passages therebetween (see figs. 1-4 of both Lenz U.S. 5,998,932 and Lenz WO 00/00992). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Imafuku et al. modified by Aruga et al. and Hasegawa et al. so as to contain the plasma confinement element of Lenz et al. in order to confine the plasma in the process region to improve process control and to ensure repeatability.

Response to Arguments

Applicant's arguments filed 5/8/03 with respect to claims 1-7, 9, and 12-13 have been fully considered but they are not persuasive.

With respect to the rejection under 35 USC 103(a) of Imafuku et al. and Aruga et al., the examiner respectfully contends that all the limitations are taught and the motivation to combine references is proper. Concerning applicant's statement that Imafuku et al. fails to show an exposed insulating surface, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, Aruga et al. provides ample motivation to cover a conductor with an insulator in a plasma environment. Aruga et al. is being used for the broad teaching of covering a conductor with an insulator for protection in a plasma environment, not any other specific apparatus limitations.

Regarding the conductive guide being grounded in Imafuku et al., it is clear from the disclosure that this is an embodiment which was envisaged by the inventors at the time of filing (see col. 11-lines 58-67). It appears that applicants are attempting to say that the Aruga et al. is non-enabled for this particular feature. In reponse to this argument, the examiner contends that U.S. Patents are presumed valid (35 USC 282) and absent any persuasive secondary evidence to show non-enablement, this rejection will also be maintained. Concerning applicant's other statements under 35 USC 103(a) it is respectfully submitted that Imafuku does not teach away from the instant invention. For example, the reference clearly teaches plasma confinement in a variety of areas (see col. 10-line 19 to col. 11-line 67). With respect to applicant's technical arguments, the arguments of counsel cannot take the place of evidence in the record. In re

Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465,43 USPQ2d 1362 (Fed. Cir. 1997).

Regarding applicant's statement that the specification of the instant application is being used as a blueprint to formulate a rejection, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See In re McLaughlin, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant's arguments concerning the remainder of the claims in the application (claims 8, 10, and 15-26) are moot in view of the new grounds of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Luz L. Alejandro
Primary Examiner
Art Unit 1763

July 1, 2003